PSE Verkehrssimulation

Activity Plans

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08. Januar 2009

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- Current State and Drawbacks
- Activities
- OD-Matrices
- Time-dependent Traffic Generation
- Route Choice

Current State

- Your traffic simulator is capable of simulating
  - Flexible traffic networks given in XML
  - Textual and visual output of simulation results
  - Traffic behaviour at various types of intersections

- Drawbacks
  - Drivers behave randomly
    - No destination-directed traffic
    - No activity plans
    - ...

Activities

- In real life drivers have certain destinations they want to reach
- Only few just cruise for fun
- Activities can be
  - Going to work / school / ...
  - Shopping
  - Leisure activities
  - ...
- Result in characteristic behaviour and patterns in traffic
  - e.g. Rush hour phenomena

OD-Matrices

- ***O***rigin-***D***estination matrices describe basic movement patterns during s certain period of time (e.g. 24 hours)
  - *N* vehicles leave origin *o* in order to get to the destination *d* during time *t*

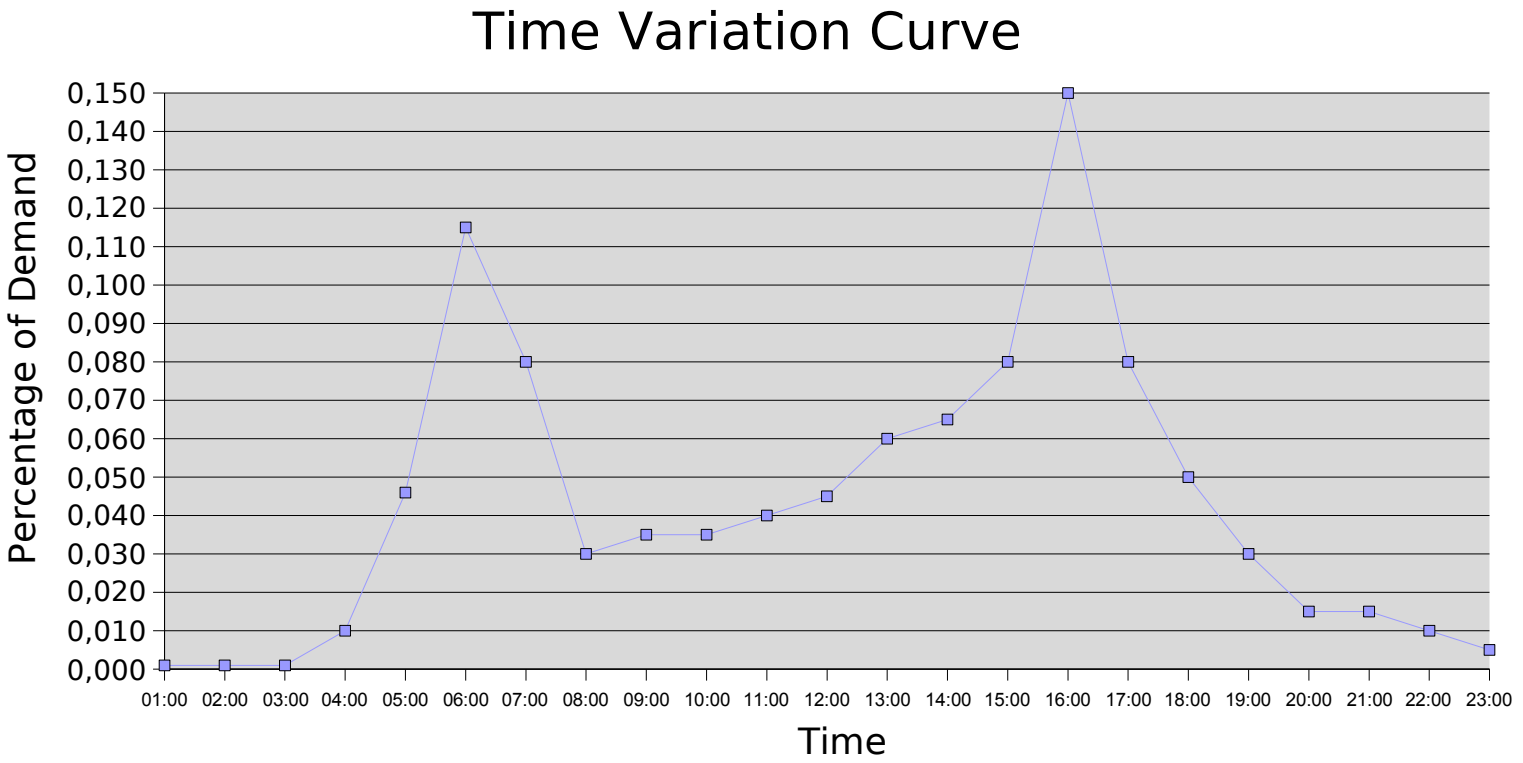
    Origin node → Destination Node = #Vehicles

Origin	Destination	#Vehicles
0	5	500
2	10	30
7	3	236
8	90	37

```
<Activities>
<simulationTime> </simulationTime>
<od>
   <sourceNode> </sourceNode>
   <destNode> </destNode>
   <vehicles> </vehicles>
</od>
...
</Activities>
```

Time-dependent Traffic Generation

- OD entry describes number of vehicles during a period of time
- Peak times etc. can be modeled using a TVC
  - Usually result of real-world traffic measurements



Time-dependent Traffic Generation (2)

- Up to now simulator generates new vehicles randomly (according to some sort of probability distribution)
- Now, TVC is applied
- Example: consider the following entry in an OD-matrix

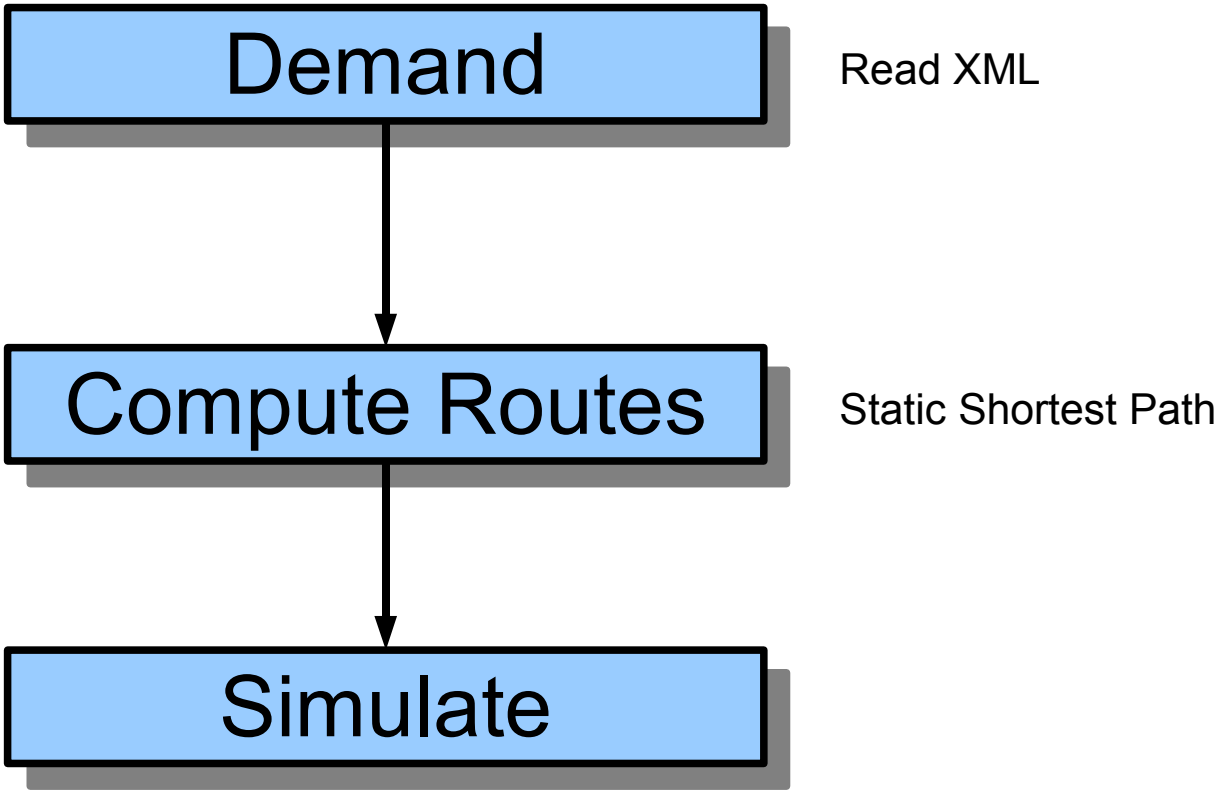
Origin	Destination	#Vehicles
5	37	80
...	...	...

This means: during simulation time *t 80* vehicles will leave node *5* in order to get to node *37*

If we consider the time slot *16:00-17:00* and apply the given TVC, this will result in *12* vehicles leaving node *5*

These *5* vehicles need to be generated in the simulation (e.g. according to a probability distribution)

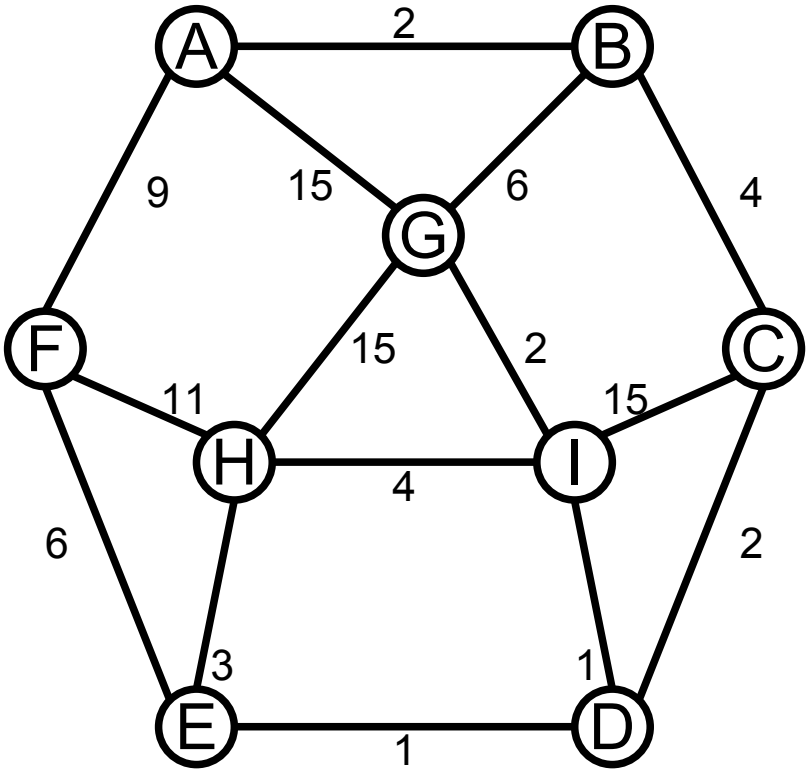
Route Choice



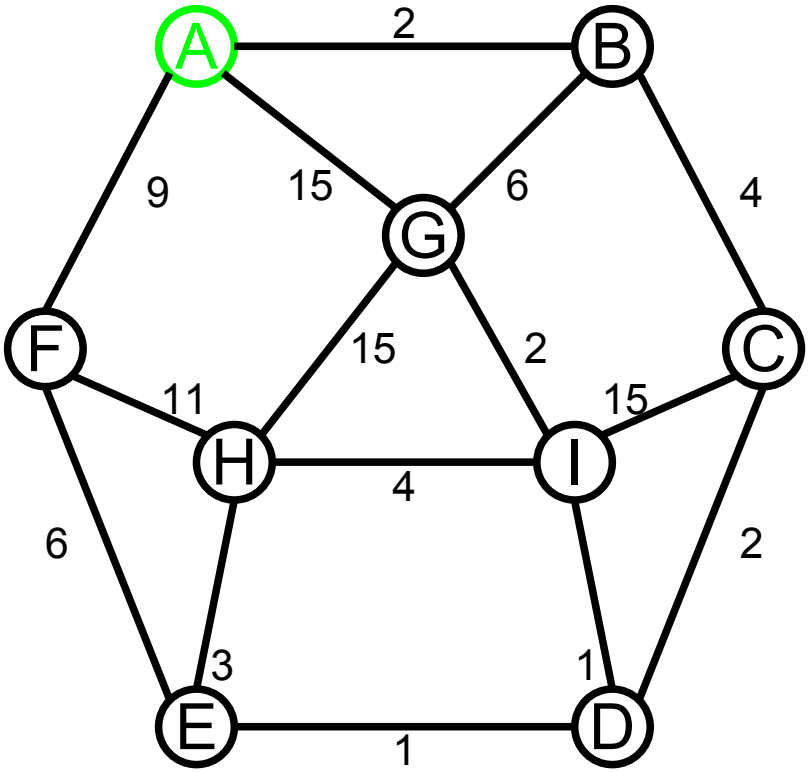
Route Choice (2)

- Route is represented by
  - Shortest Path
  - Fastest Path
  - ...
- Route is given by a sequence of nodes or edges
- We only consider static routing
- Dijkstra's Shortest Path Algorithm can be used for computing a route
- Memory efficiency and fast computation is essential

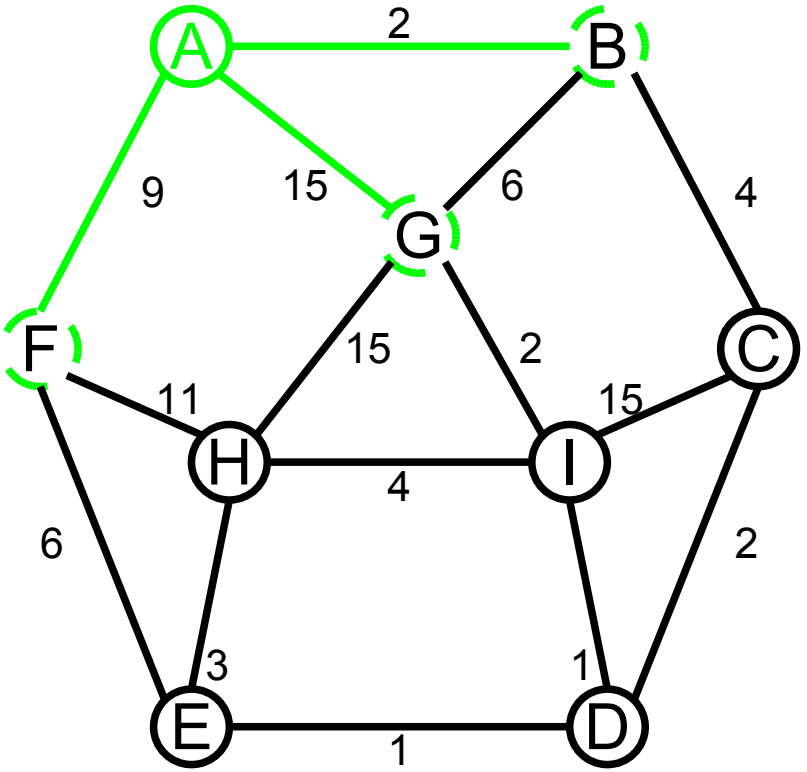
Dijkstra – Example (1)



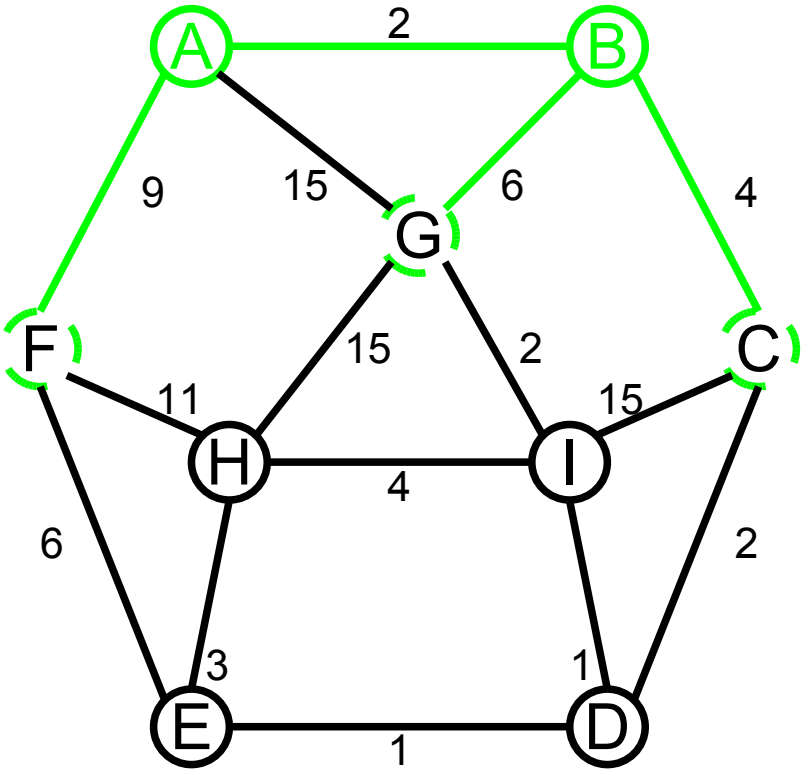
Dijkstra – Example (2)



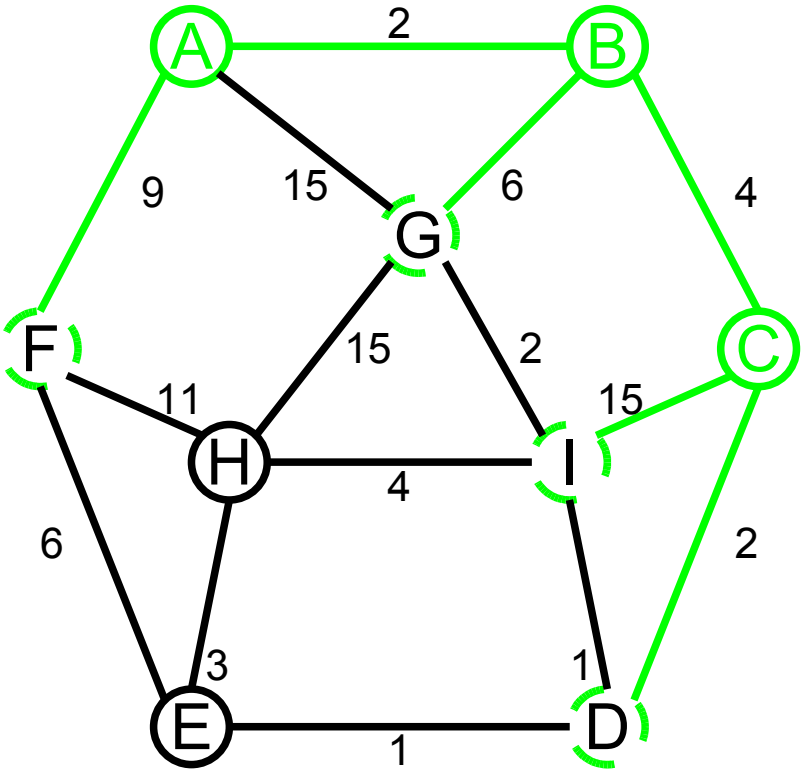
Dijkstra – Example (3)



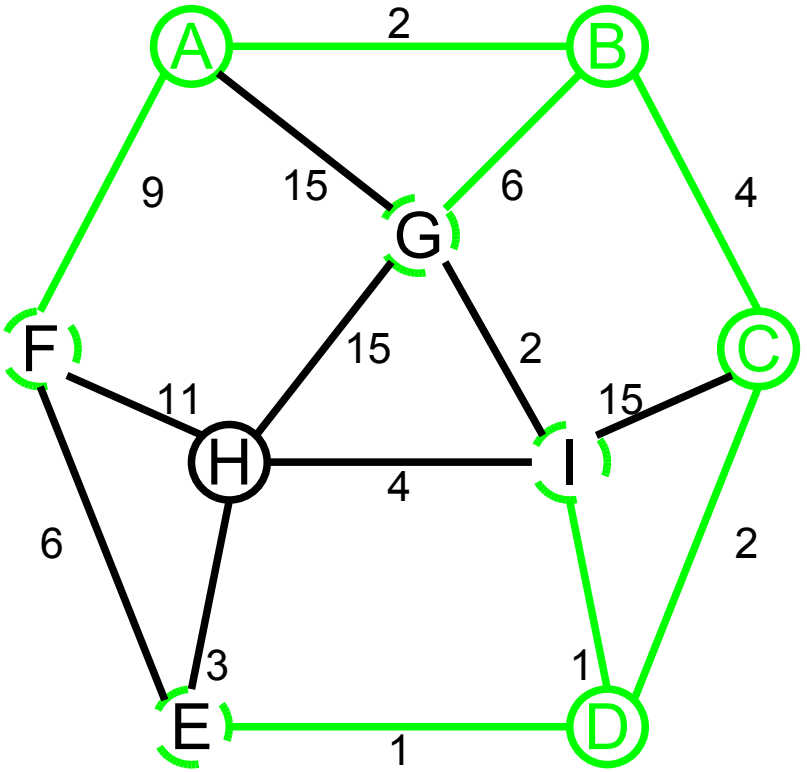
Dijkstra – Example (4)



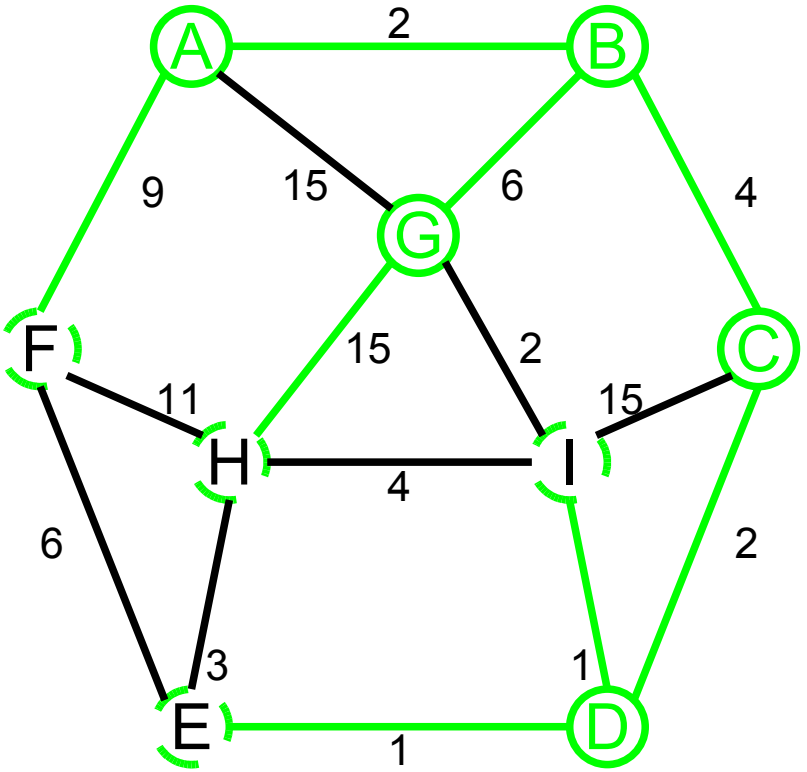
Dijkstra – Example (5)



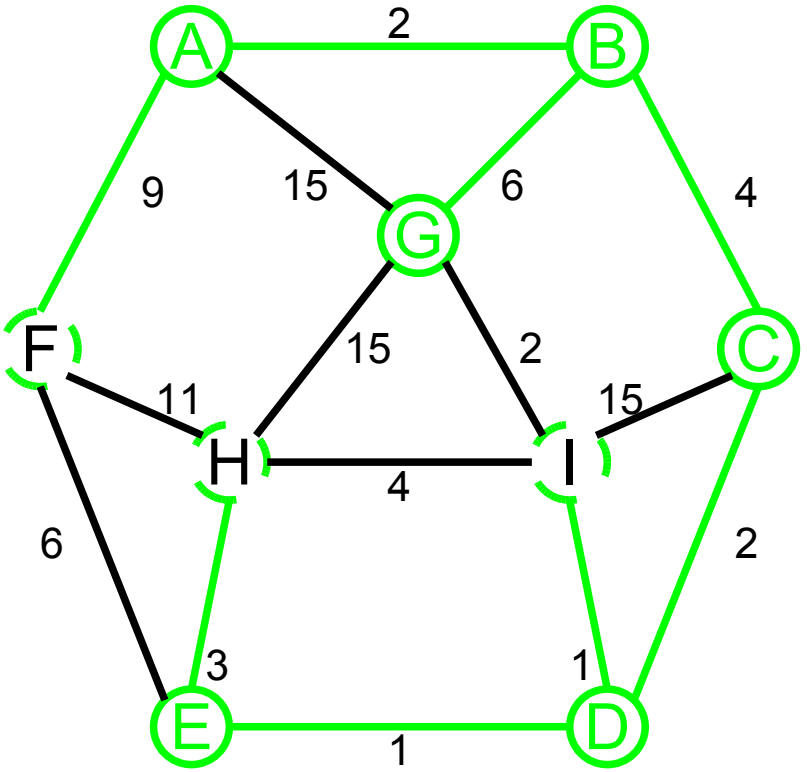
Dijkstra – Example (6)



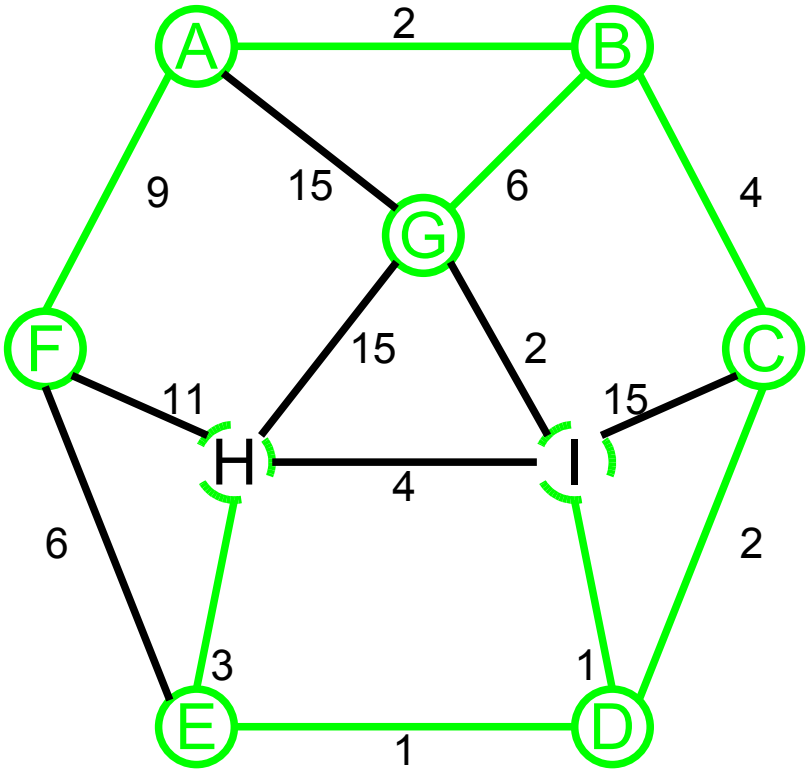
Dijkstra – Example (7)



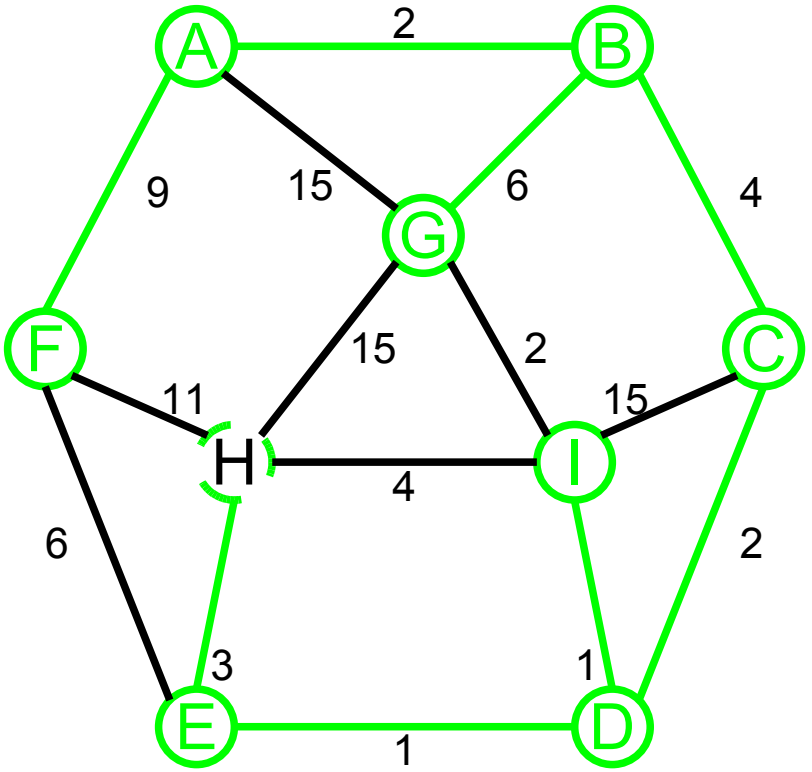
Dijkstra – Example (8)



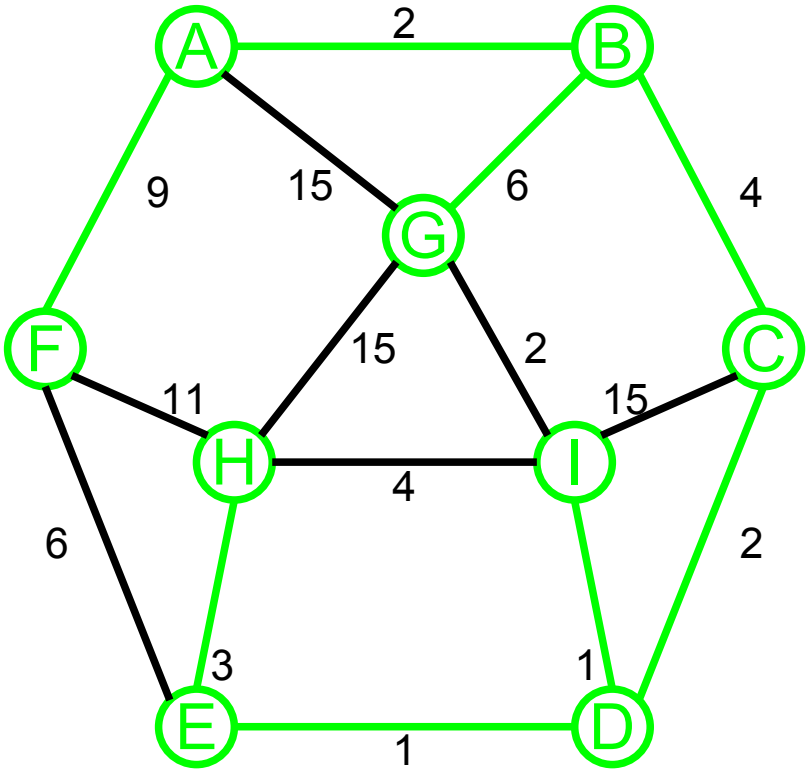
Dijkstra – Example (9)



Dijkstra – Example (10)



Dijkstra – Example (11)



Questions?

Anhang

Zuordnung Knoten Graph – Pixel Grafik, z.B. für KA_3_0

```
<Node>
  <id>103190761</id>
  <pixelX>132</pixelX>
  <pixelY>987</pixelY>
</Node>
<Node>
  <id>105229319</id>
  <pixelX>3458</pixelX>
  <pixelY>1463</pixelY>
</Node>
```

Anhang

- Aktuelles Verzeichnis in Java ermitteln:

```
File userDir = new File(System.getProperty("user.dir"));
```

- Filechooser mit diesem initialisieren:

```
JFileChooser fc = new JFileChooser(userDir);
```